Amendments to the Specification

Please replace the paragraph on page 2, lines 6-11, of the specification with the following amended paragraph.

Known methods for preparing micro-structures include those for directly preparing micro-structures by means of a semiconductor processing technique such as a micro-pattern forming technique that typically utilizes photolithography using light with a shorter wavelength, electron beam exposure or X-ray exposure.

Please replace the paragraph on page 2, line 19-23, thru page 3, line 1 of the specification with the following amended paragraph.

Research efforts are being paid for developing techniques of utilizing the phenomenon of self-organization because such techniques appear to be very promising for easily realizing micro-structures in the order of micrometers or nanometers ~~micrometer or nanometer~~.

Please replace the paragraph on page 3, lines 2-23, of the specification with the following amended paragraph.

As for anodization of aluminum, a porous oxide film coat (anodized alumina) is formed when an aluminum plate or an aluminum film formed on a substrate is anodized in an acidic electrolyte. (See RC. Furneaux, W. R. Rigby & A. P. Davidson, Nature, Vol. 337, P147 (1989).) Such a porous oxide film coat is characterized by having a peculiar ~~geographic~~ structure where very small cylindrical pores (nano-holes) of a diameter between tens to hundreds of several nanometers are arranged in parallel at intervals (cell size) of also tens to hundreds of several

nanometers. When the gap separating the pores is tens of several nanometers or more, the pores show a high aspect ratio and their diameters are relatively highly uniform if viewed in cross section. The diameters and the intervals of the pores can be controlled to a certain extent by selecting the type of acid and regulating the voltage for anodization. Specifically, the intervals of the pores can be reduced by lowering a voltage. On the other hand, the thickness of the anodized film coat and the depth of the pores can be controlled to a certain extent by controlling the time for anodization.

Please replace the paragraph on page 5, lines 3-13, of the specification with the following amended paragraph.

Now, as the demand increases for devices such as CCDs formed by incorporating semiconductor parts and made to be more downsized and sophisticated, semiconductor processing techniques such as lithography are required to show a precision level of 0.1 μm or higher. However, when deep ultraviolet rays or X-rays whose wavelength is even shorter are used for the light source, there arises a problem that preparation of a scaled ~~sealing~~ down optical system is difficult and the light source inevitably has large dimensions. In the case of electron beam lithography, the drawing speed is low.

Please replace the paragraph on page 5, lines 27 thru page 6, line 3, of the specification with the following amended paragraph.

It is, therefore, an object of the present invention to provide a semiconductor device of a size of the order of nanometers that can exhibit ~~expect~~ a quantum effect and an array of such semiconductor devices.

Please replace the paragraph on page 6, lines 10-17, of the specification with the following amended paragraph.

In view of the above identified circumstances, the inventors of the present invention researched ~~made various research efforts for~~ the above problems and found that semiconductor nano-devices can be formed and arranged highly densely by using a novel nano-structure material that can be used to form cylinder-shaped structures having a size in the order of nanometer. The present invention is based on this finding.

Please replace the paragraph on page 12, line 27 thru page 13, line 7, of the specification with the following amended paragraph.

Aluminum wires were prepared as a structure including aluminum pillars as so many aluminum parts of the structure and a silicon part surrounding the cylinder-shaped aluminum pillars, of which the aluminum pillars had a diameter 2r of 3 nm and a length L of 200 nm and were arranged in such a way that each pillar was separated from adjacent pillars by ~~an international distance~~ a gap 2R of 7 nm.

Please replace the paragraphs on page 13, line 10 thru page 14, line 3, of the specification with the following amended paragraph.

An aluminum/silicon mixture film containing silicon by 55 atomic% relative to the total quantity of aluminum and silicon was formed to a thickness of about 200 nm on a glass substrate by RF magnetron sputtering. A target formed by placing eight 15 mm-squared ~~mm-squre~~ silicon chips 13 on a 4-inch aluminum target was used. The sputtering operation was conducted by

using an RF power source under the condition of an Ar flow rate: 50 sccm, a discharge pressure: 0.7 Pa and a making power: 1 kW. The substrate was held to room temperature.

While the target was formed by placing eight 15 mm-squared ~~mm-squre~~ silicon chips 13 on an aluminum target in this experiment, the number of silicon chips is not limited to eight and may be varied depending on the sputtering condition so long as the formed aluminum/silicon mixture film contains silicon by about 55 atomic%. The target is not limited to one obtained by placing silicon chips on an aluminum target. Alternatively, a target formed by placing aluminum chips on a silicon target or a target formed by sintering powdery silicon and powdery aluminum may be used.

Please replace the paragraph on page 15, lines 10-20, of the specification with the following amended paragraph.

As specimen A for comparison, an aluminum/silicon mixture film containing silicon by 15 atomic% relative to the total quantity of aluminum and silicon was formed to a thickness of about 200 nm on a glass substrate by sputtering. A target formed by placing two 15 mm squared ~~mm-squre~~ silicon chips 13 on a 4-inch aluminum target was used. The sputtering operation was conducted by using an RF power source under the condition of an Ar flow rate: 50sccm, a discharge pressure: 0.7Pa and a making power: 1kW. The substrate was held to room temperature.

Please replace the paragraph on page 16, lines 11-21, of the specification with the following amended paragraph.

Additionally, as specimen B for comparison, an aluminum/silicon mixture film

containing silicon by 75 atomic% relative to the total quantity of aluminum and silicon was formed to a thickness of about 200 nm on a glass substrate by sputtering. A target formed by placing fourteen 15 mm-squared ~~mm-squre~~ silicon chips 13 on a 4-inch aluminum target was used. The sputtering operation was conducted by using an RF power source under the condition of an Ar flow rate: 50 sccm, a discharge pressure: 0.7 Pa and a making power: 1 kW. The substrate was held to room temperature.

Please replace the paragraph on page 18, lines 12-22, of the specification with the following amended paragraph.

Still additionally, as specimen C for comparison, an aluminum/silicon mixture film containing silicon by 55 atomic% relative to the total quantity of aluminum and silicon was formed to a thickness of about 200 nm on a glass substrate by sputtering. A target formed by placing eight 15 mm~~-squre~~ silicon chips 13 on a 4-inch aluminum target was used. The sputtering operation was conducted by using an RF power source under the condition of an Ar flow rate: 50 sccm, a discharge pressure: 0.7 Pa and a making power: 1 kW. The substrate was held to 250°C.

Please replace the paragraph on page 39, line 19 thru page 40, line 1, of the specification with the following amended paragraph.

Then, an aluminum/silicon mixture film 106 ~~105~~ was formed on the glass substrate 103 to a thickness of 200 nm by magnetron sputtering. A target prepared by placing six 15 mm square silicon chips on a circular aluminum target having a diameter of 4 inches (101.6 mm) was used. The sputtering operation was conducted by using an RF power source under the condition

of an Ar flow rate: 50 sccm, a discharge pressure: 0.7 Pa and a making power: 300W. The substrate was held to room temperature (25°C).

Please replace the paragraph on page 55, line 17 thru page 56, line 25, of the specification with the following amended paragraph.

Then, gold particles were formed on the bottom of the pores as in Example 1. Thereafter, the porous silicon oxide thin film was placed in a quartz tube, in which a target containing indium phosphide by 99% and zinc by 1% had been arranged at the focal position of an Nd-YAG laser (wavelength: 1064nm, average 2.5W) in advance. Then the porous silicon oxide film was heated to 800°C, while argon gas was made to flow there at a rate of 100 sccm under a pressure of 1.3×10^4 Pa, and a laser beam was irradiated onto the target for 10 seconds. Subsequently, a laser beam was irradiated onto a target containing indium phosphide by 100% for a second in the same condition. Thereafter, the target was replaced with one containing indium phosphide by 99% and tellurium by 1% and irradiated with a laser beam for 10 seconds in the same condition. The duration of each laser irradiation in this step was determined in a preliminary experiment that was conducted in advance. As a result of the above described step, pillars of indium phosphide, each having three layers including a layer of p-type indium phosphide formed by using zinc as dopant, a layer of indium phosphide formed without using any dopant and a layer of n-type indium phosphide formed by using tellurium as dopant that were arranged on the substrate in the above mentioned order, hence including a p-i-n junction, were produced by using the gold particles on the bottom of the pores as catalyst. The porous silicon oxide thin film was then polished at the surface thereof to remove the unnecessary indium phosphide adhered. Thereafter, the obtained product was observed through an FE-SEM to find that indium phosphide

had been formed in the pores. When observed by X-ray diffractometry, diffraction lines attributable to crystalline indium phosphide were found to prove that the introduced indium phosphide of the pillars was crystalline.